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Deregulation and Labor Earnings

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University of Illinois Urbana-Champaign

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ABSTRACT

In this paper I use cross sectional data drawn from the March CPS from 1968 to 1988 and the May CPS from 1973 to 1988 to estimate the impact of deregulation on labor earnings. Earnings in trucking, telephones, bus transportation, air lines and railroads are analyzed. Both average differentials and union-nonunion differentials are computed. Contrary to some popular belief, deregulation is not found to reduce earnings in many of these industries. Implications for theories of regulatory impact are discussed.

Introduction

In a 1977 article, Hendricks used data from the 1970 Census of Population to compare wages in regulated industries with wages paid in manufacturing industries. The results suggested that the primary source of high wages in regulated industries was the high degree of unionization in these industries combined with high levels of concentration in the product market. Except truck drivers in trucking and electricians in radio and television and possibly in air transportation, regulated industries typically paid lower wages than unregulated manufacturing industries when industry and personal characteristics were controlled.

Since then several natural experiments in deregulation have occurred that can shed new light on this question. What's more, data now exist yearly on individual earnings. Some of these data also include union membership identification. This potentially allows clearer tests of hypotheses about the impact of the interaction of union membership and regulation on earnings. It thus seems appropriate to reevaluate the evidence based on the 1980's experience with deregulation.

This paper concentrates on the movement of wage differentials between 1967 and 1988 in five industries: telephone service, railroad transportation, trucking services, airline transportation and bus transportation. Each experienced some form of deregulation in the later 1970's or early 1980's. In the next section, we summarize the form of deregulation and possible impacts on labor earnings in each industry.

Background on Deregulation

Airlines

Congress began an era of deregulation with the passage of the Airline Deregulation Act in 1978. The Act phased out the Civil Aeronautics Board and made entry and exit from the industry much easier. Since the CAB oversaw merger activity in the industry, one by-product of deregulation was an easing of regulations on merger activity. Thus, while passage of the Act encouraged deconcentration in the industry by freeing up entry, it also allowed more possibilities for concentration at certain hubs through merger activity.[1]

Airline workers are covered under the Railway Labor Act rather than the National Labor Relations Act. Consequently, all workers are covered by system-wide agreements rather than agreements tailored to particular markets. If an airline faces particularly strong competition in one market, it cannot attempt to get wage concessions from workers in that market. It must get concessions from workers throughout the system. Thus entry of low cost, non-union firms in a few markets could potentially have impacts throughout the industry.

Most observers believed that the airline industry would be "workably contestable" in the absence of regulation. Regulation was viewed as increasing prices to customers. Thus, they expected deregulation to reduce union power.

In the most comprehensive study of the impact of deregulation on earnings in airlines, Card(1989) found almost no deregulation impact when comparing pre- and post-deregulation earnings in airlines with earnings of production workers.

Trucking

While Congress passed the Motor Carrier Act that deregulated trucking in 1980, most analysts use 1979 as the start of deregulation. The Interstate

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[1] For a more thorough discussion of the effects of deregulation, see Moore (1986).

Commerce Commission (ICC) had started reforms in late 1978 that had begun effective deregulation of entry and rates.

There seemed little question that trucking would be highly competitive in the absence of regulation. Thus, a strong case could be made for the prediction of a decline in union power in the industry after deregulation. While the impact of deregulation on union earnings seems clear cut, its effect on non-union wages is more ambiguous. Non-union wages might have been higher in the industry because of the threat of unionization. A reduction in union power therefore also might bring on a decrease in non-union wages. On the other hand, deregulation might act to increase the demand for non-union truck drivers and increase their wages relative to workers in other industries.

Two major papers have covered the impact of deregulation on earnings in trucking. Both Rose(1987) and Hirsch(1988) concentrate on the impact of deregulation on the union wage differential. Both find a decline in the differential after deregulation. In addition Hirsch(1988) finds no change in the differential between non-union drivers and operatives after deregulation.

Railroads

While the predictions associated with institutional reform seem clear cut in airlines and trucking, they become more ambiguous in railroads. The amount of competition that would exist in the industry without regulation has always been controversial. Even without competition from other railroads, pricing by individual roads will still be constrained by potential competition from trucks. How much this potential competition constrains market power is open to question.

The major change in railroad regulation in the 1980's was the passage of the Staggers Act in 1980. The Act did not deregulate the industry, but it did allow significantly more flexibility for individual railroads to abandon non-profitable runs and provided more flexibility to raise or lower prices.

Most analysts believed that the Staggers Act would allow railroads to lower prices and capture traffic from other modes. If price cutting became the norm, an effect on union wages similar to the trucking effect might have occurred. But rail rates increased after deregulation.[2] The combination of decreased rates in trucking due to concurrent deregulation in that area and increased rates in railroads meant that the market share for railroads declined. Thus, the impact of deregulation on earnings in railroads is unclear. The increase in rates could mean that the companies were using their market power to move toward monopoly restriction of output. Railroad unions could use their power to demand a share of these rents. Still, increased ability to shut down unprofitable lines could have shifted bargaining power in favor of management, leading to a reduction in relative wages. Clifford et al (1990) citing the American Association of Railroads claim that deregulation led to a 20% decline in wages for railroad workers and a loss to labor of $1 billion (1977 dollars).

Inter-city Busing

Prior to passage of the Bus Regulatory Reform Act in 1982, there were two major carriers in the industry, Greyhound and Trailways. With passage of the act, Congress granted bus companies greater flexibility in rate making and greater ease of entry and exit. This led to a reduction of service. Dempsey(1988) estimates that 4514 communities lost service while 896 gained service. In addition, Greyhound and Trailways merged in 1987, leaving only one large firm in the industry.[3]

Like railroads, the impact of bus deregulation on labor earnings is ambiguous. Virtual monopoly by Greyhound could lead to increases in rents that

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[2] See Boyer(1987) for a more detailed account of the movement of relative prices and market shares.

[3] Greyhound Corporation no longer owns Greyhound Bus Lines, although they do own a few small carriers. As part of the sale, they agreed not to reenter the industry prior to March, 1992.

could be absorbed by the unions. On the other hand, management ability to drop unprofitable routes could cause a shift in relative power and a reduction in relative wages.

Telephones

Most of the telephone service industry has not been deregulated. Local service remains tightly regulated by the states and AT&T long-distance service is also regulated. Only the new entrants in the long distance market are unregulated, but they employ less than three percent of telephone service workers.

The major changes that have occurred in the industry involve the divestiture of the Bell Operating Companies in 1984 and the subsequent changes in bargaining structure in the industry. Prior to divestiture, the centralized agreement between AT&T and the Communications Workers and the IBEW was the largest in the country and covered over 600,000 workers. After divestiture the unions had to bargain separately with AT&T and the seven regional holding companies.[4]

There are several reasons for believing that regional or local bargaining might result in lower settlements. First, regulatory agencies might be more prone to question high wage costs when there is not a "national" agreement . Second, management at several new Bell Operating Companies (BOC's) expressed the view that AT&T had given them a legacy of wages that were 20% to 30% too high for their labor markets (Perry and Cappelli, 1988). They were determined to bring wages more in line with local competition. Third, several BOCs were committed to a business strategy of expansion into competitive areas where competition in labor costs was more intense.

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[4] A detailed account of changes in bargaining in telecommunications can be found in Hendricks(forthcoming)

Contrary to these predictions, Peoples(forthcoming) found no change or a slight increase in relative wages for operators after divestiture.

Regulation Impact on Earnings

Regulation could increase earnings in two ways. First, earnings could be higher in regulated industries than in industries with similar structure if regulatory agencies set prices in an attempt to guarantee rents for the firms in the industry. The sharing of these rents was once viewed as purely a union phenomenon. However, recent "insider models," efficiency wage models and models that rely on notions of fairness and ability to pay, all suggest that there is potential for non-union workers to share in these rents as well (Dickens and Katz, 1987).

Second, earnings could be higher in regulated industries due to restrictions on entry. These restrictions probably would lead to higher union density and firm concentration that would exist in their absence. To the extent that both are associated with higher earnings, wage differentials with other industries would increase.

If the first explanation of regulation impact is correct, a regression of labor earnings on worker characteristics, industry characteristics and industry identifiers should yield positive wage differentials for regulated industries. If the second explanation is correct, a regression that includes worker characteristics should yield positive differentials, but inclusion of industry characteristics should drive these differentials to zero.

If the sharing of rents is purely a union phenomenon, then union members' wages should be increased more by regulation than nonunion workers' wages. The union-nonunion differential would then be larger in these industries.

Suppose that we now introduce deregulation of rates and allow more entry into the industry. If the first explanation of regulatory impact is correct, wage differentials should fall in regressions that either include or exclude industry characteristics. If the second explanation is correct, then no change in differentials should be observable in regressions that include industry characteristics. If the sharing of rents occurred only for union workers, a narrowing of the union-nonunion differential should be evident.

Thus estimation of a time series of wage differentials for deregulated industries under alternative specifications should provide significant information to evaluate different views of the impact of regulatory policy on labor earnings.

Earnings Data and Individual Characteristics

This paper uses three sources of wage data. The first provides monthly average hourly wages for production workers collected by the Bureau of Labor Statistics and published in the Monthly Labor Review. These data are available for the telephone industry, trucking and railroads, but are not available for airlines or buses. We collected data between January, 1968 and December, 1988.

The second source of wage data is the Annual Demographic File of the Current Population Survey (CPS). This file provides retrospective information collected in March of each year for the previous year's earnings. We have collected data from March 1968 through March 1989 (excluding 1983). These data therefore cover the period 1967 to 1988. Card(1989) used the 1977 through 1988 March data in his analysis of airline earnings.

The third source of wage data is the "earnings supplement" questionnaire of the CPS. These data are gathered from respondents who will not be interviewed

the following month (the "outgoing rotation group (OGRG)"). The questions refer to earnings and employment information from the previous week. Beginning in 1973, the May OGRG were asked questions about union membership. Beginning in 1983, the March OGRG were also asked the union membership question. We gathered data from the May OGRG covering the period 1973 to 1988 and from the March OGRG covering the period 1983 to 1988. The March and May data from 1983 to 1988 were merged and are called "May" data in this paper. The union membership question was not asked in 1982 and these data are not included. Both Rose(1987) and Hirsch(1988) used 1973 through 1985 May data (excluding 1982) in their analyses of earnings in the trucking industry; Card(1989) used 1979 through 1988 in his analysis of airline earnings; Peoples(forthcoming) used 1977 through 1988 in his analysis of earnings for telephone operators.

Each of these sources has drawbacks.[5] The BLS data yield only industry average wages. It is therefore difficult to control for quality differences in labor forces that might change over time. This problem can be potentially overcome in both CPS samples. The March data carry the advantage of larger sample sizes and correspondingly smaller estimated errors. Unlike the BLS average hourly earnings series and the May weekly earnings data, March averages may be strongly influenced by the number of hours worked and the number of weeks worked by part time workers. To compensate for this problem, the March data are restricted to individuals who reported working at least 26 weeks in the previous year, who earned at least $1000, and who worked for only one employer. The May data have the strong advantage of identifying union members. Unfortunately, the sample sizes are somewhat small. In addition, average weekly earnings are censored at $999 per week (compared to $99,999 per year in the March data).

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[5] Card(1989) provides a detailed comparison of the problems associated with the two CPS files.

Industry Characteristics

Data on union density by industry were gathered from Freeman and Medoff(1979), Kokkelenberg and Sockell(1985) and Curme, Hirsch and Macpherson(1989)[6].

Data on adjusted concentration ratios were taken from Weiss (1966) and Weiss and Pascoe (1986). These sources provide estimates of concentration ratios for manufacturing industries based on data from 1962, 1972 and 1977. Values between 1967 to 1971 were estimated as weighted linear combinations of the estimates for 1962 and 1972. The same procedure was used for the years between 1972 and 1977. An estimate of the adjusted concentration ratio for 1982 was obtained by multiplying the measured concentration ratio for 1982 by the ratio of the adjusted to the measured value for 1977. Values for years between 1977 and 1982 were estimated as weighted linear combinations of the estimates for 1977 and 1982. Since the 1987 concentration ratios have not been published, the values for 1982 were used for 1982 to 1988.

Data on adjusted concentration ratios for regulated industries were estimated following the approach in Weiss(1966) and Hendricks(1977). Unfortunately, very little data exist to evaluate the impact of deregulation on changes in concentration ratios. Except airlines, no changes in these data were available. For airlines, the Department of Transportation(1990) published concentration figures for city pairs for 1979 through 1988. These figures were used to estimate concentration in the airline industry.

Since inclusion of a measure of concentration restricts the sample to only manufacturing and selected regulated industries, the sample sizes are much smaller for these regressions. What's more, there is probably substantial error

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[6] We would like to thank Barry Hirsch for providing the density data for 1983-88 on diskette.

in the concentration measure. Therefore, we have also run regressions that include the density measure but exclude concentration.

Results

Figures 1a to 1c graph the yearly percentage differential between manufacturing production workers and each deregulated industry for data from BLS average production worker wages, March yearly earnings and May weekly earnings data respectively. Railroad workers have the highest average differential over the period, averaging 49-54%[7] in the March-May data and 38% in the BLS data. They are followed by airline and phone workers who averaged 35-39% in the March-May data (phone workers averaged 20% in the BLS data). Trucking differentials averaged 25% in the BLS data, 14% in the March data and 21% in the May data. Bus workers had negative differentials throughout the period that averaged approximately 26% in the March-May data.

The raw differentials show a significant decline in earnings after deregulation for only one industry, trucking. There is no difference in the differential in the March data (covering 1967 to 1988), a 7% decline in the BLS data (covering 1968-1988) that is almost significant and a 10% decline in the May data (covering 1973 to 1988). Obviously this measurement is influenced by the length of the time series. The trucking wage differential with manufacturing peaked just before deregulation in the March-May data and in 1973 in the BLS

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[7] The average values reported are computed by taking a weighted average of the coefficients for individuals years using the inverse of the estimated variance of the coefficients as weights. The percentages are computed as $(e^{\beta-1}-1) \times 100\%$ where β is the regression coefficient and e is the natural log. The estimated average coefficients (βs) and their associated standard errors are given in Table 1.

data. If the May data existed for 1967-1972, a smaller change in the differential would have been estimated.

In the four other industries the differential had a significant increase in at least one data series. The telephone earnings differential increased between 9 and 20 points and the increase was significant in all three data sets. The railroad differential increased by 17% in the BLS and March data series but only 2% in the May series. Busing showed an increase in the May data, but a decrease in the March data (not significant). Finally, airlines showed a modest 4% increase in the March data and no change in the May data.

Figures 2a-b provide the same wage differentials controlling for worker characteristics (age, education, marital status, veteran status, gender, race, occupation, weeks worked and hours per week)[8] in the March and May data. Differentials for railroads, airlines and telephone remain high, averaging 20 to 28% over the period. The trucking differential falls to zero when worker characteristics are included and the bus differential improves to -14% to -21%. The comparisons of pre- and post-deregulation eras provide similar results to the raw differentials. Both airline and railroad differentials have significant increases in both data sets (8 to 11% for railroads and 4% to 10% for phones). The trucking differential decreased by 3% while the airlines differential increased 5% using the March data, but neither showed a significant change in the May data. The busing differential again showed a significant increase in the May data (10%) but little change in the March data.

Figure 3 provides evidence on movement of the union-nonunion differential in phones, trucking, airlines, railroads and the all-industry average from the May data, 1973-1988. These series were estimated from yearly regressions that included individual characteristics, a union membership dummy variable and

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[8]Appendix one provides a detailed list of the control variables used in these regressions.

interaction terms between the dummy and industry dummy variables. The average union-nonunion differential increased to a peak in 1977, and then declined slightly until 1983. The average over the period was 25%. Both trucking (40%) and airlines (30%) had higher union differentials than average; both also peaked in 1977 and fell even more dramatically than the average between 1978 and 1983. While unions in both industries rebounded after the period, the decline from 49% to 32% for the Teamsters was significant, while a smaller 6% erosion was experienced by the airlines unions (not significant).

Both the telephone and the railroad industry have had somewhat small union-nonunion differentials. This may be due to the small number of nonunion workers in these industries. Rail industries averaged a modest 8% differential while the differential for phone workers was negative. Both expanded the differential after deregulation. This brought the union workers in telephones on par with nonunion workers (a significant increase in the differential) and increased the differential in railroads to about 18% (an insignificant increase in the differential).

A similar pattern of movement in wage differentials is apparent with raw differentials, differentials controlling for worker characteristics and union-nonunion differentials. The impact on worker earnings seems dependent on the extent of new competition in the industry. None of the industries experienced the declines in relative earnings that occurred in trucking. The trucking decline also was almost exclusively a union phenomenon - the decline for average workers in the industry was small or non-existent. What's more, relative earnings may have even increased in several of these industries. These results suggest that pre-deregulation pricing policies may not have been a source of increased earnings for workers in these industries.

Further evidence on the regulation impact is provided in figures 4a-4b and 5a-5b. Figures 4a and 4b plot yearly wage differentials controlling for union density and worker characteristics; figures 5a and 5b plot yearly wage differentials controlling for density, worker characteristics and product market concentration (by inclusion of concentration and a density-concentration interaction term). While there is some yearly fluctuation, almost the entire raw wage differential in trucking and railroads is explained by worker characteristics and union density. This is not true in telephones and airlines. They maintain differentials averaging approximately 10% and 19% respectively. In busing the raw differential is largely unaffected by the union density measure.

As was found by Hendricks(1977), inclusion of concentration in addition to union density explains the remaining differential in airlines and telephones. In the March data, the highest average differential for 1967-1988 occurred in trucking at a modest 3%; in the May data the highest value occurred for airlines at 7%.

The results for the change in the differential are a mixed bag. Both the March and May data show a decline in the trucking differential after deregulation. Since this estimate controls for the decline in union density in trucking, it provides some evidence that the fall in relative wages may not be entirely explained by the entry of nonunion competition. Railroads and busing show similar declines after deregulation. The busing result might be explained by the monopsony effect of the Greyhound merger. However, the railroad result is puzzling and in direct conflict with the positive estimations in other specifications.

The March data show a small increase in the differential controlling for industry structure for both airlines and telephones. The May data, however,

suggest a decline. It is therefore difficult to draw any conclusions based on these results for these industries.

Summary and Conclusions

We have tried to estimate the impact of deregulation on earnings in several industries. A comparison of these impacts indicates that deregulation, *per se*, is not necessarily bad news for workers. In some industries, deregulation has allowed firms to increase their control in some markets and raise prices. This has occurred, in part, due to the much more lax approach taken to horizontal mergers in the 1980's than in previous decades. Thus, the notion that regulation has served simply to pass through costs to consumers cannot be totally accurate. Some workers' earnings have increased after deregulation.

The strongest deregulation impact, no matter how it's measured, occurred in trucking. But even here, the impact has been almost solely in the union sector. What's more, deregulation has had a substantial impact on employment in the industry. Figure 6 shows employment for trucking, telephones, railroads and motor vehicles (as a control). While employment has been somewhat constant in telephones and motor vehicles, railroad employment has been continually declining and trucking employment has had a large upswing since deregulation. It is unclear, a priori, whether workers are better off with declining employment and expanding wage differentials or expanding employment and shrinking differentials.

These results suggest that regulation's primary impact in the labor market has been to shield union workers from nonunion competition. Narrowing union-nonunion differentials in trucking and airlines are the apparent reasons for the

widely held view that deregulation has been very bad for workers. Average wages in these industries have been affected very little by deregulation.

Bibliography

Boyer, Kenneth D. "The Costs of Price Regulation: Lessons from Railroad Deregulation." Rand Journal of Economics 18(Autumn 1987) pp 408-416.

Card, David."Deregulation and Labor Earnings in the Airline Industry," Princeton University Department of Economics Working Paper, October 1989.

Curme, Michael A., Barry T. Hirsch and David A. Macpherson. "Union Membership and Contract Coverage in the United States, 1983-1988." Center for Applied Research, University of North Carolina at Greensboro Working Paper in Economics No. ECO891002, October, 1989.

Dempsey, Paul S. "The Empirical Results of Deregulation: A Decade Later, and the Band Played On." Transportation Law Journal 17 (Spring 1988) pp 31-100.

Dickens, William T. and Lawrence F. Katz. "Interdustry Wage Differences and Industry Characteristics." in K. Lang and J. Leonard (eds) Unemployment and the Structure of Labor Markets. New York: Basil Blackwell, 1987. pp 48-89.

Freeman, Richard B. and James L. Medoff, "New Estimates of Private Sector Unionism in the United States." Industrial and Labor Relations Review 32 (January 1979). pp 143-74.

Hendricks, Wallace. "Regulation and Labor Earnings". Bell Journal of Economics 8 (Autumn 1977) pp 483-496.

Hendricks, Wallace and Susan Sassalos. "Labor Relations Since Divestiture" in B. Cole (ed) Divestiture Five Years Later. Columbia University Press (forthcoming)

Hirsch, Barry T. "Trucking Regulation, Unionization. and Labor Earnings: 1973-85," Journal of Human Resources Vol 23, No. 3 (Spring 1988) pp 296-317.

Kokkelenberg, Edward C. and Donna R. Sockell, "Union Membership in the United States, 1973-81." Industrial and Labor Relations Review 38 (July 1985) pp 497-543.

Moore, Thomas Gale."US Airline Deregulation: Its Effects on Passengers, Capital and Labor." Journal of Law and Economics 24 (April 1986) pp 1-28.

Peoples, James. "Wage Outcomes Following the Divestiture of AT&T," Information Economics and Policy Journal (forthcoming).

Perry, Charles R. and Peter Cappelli. "Labor Relations in Telecommunications". University of Pennsylvania Discussion Paper #37, July, 1988.

Rose, Nancy L. "Labor Rent Sharing and Regulation: Evidence from the Trucking Industry," Journal of Political Economy Vol 95, No. 6 (December 1987) pp 1146-1176.

Weiss, Leonard W. "Appendix to Concentration and Labor Earnings", Mimeographed, 1966.

Weiss, Leonard W. and George A. Pascoe, Jr. Adjusted Concentration Ratios in Manufacturing, 1972 and 1977. Statistical Report of the Bureau of Economics to the Federal Trade Commission, June 1986.

Winston, Clifford, Thomas M. Corsi, Curtis M. Grimm and Carol A. Evans. The Economic Effects of Surface Freight Deregulation. Washington, D.C.: The Brookings Institution, 1990.

Appendix

The regressions performed on the March and May CPS data were estimated yearly (1967 to 1988 for March and 1973 to 1988 for May). Each yearly regression was of the general form:

$$\log(\text{earnings})_j = \sum_{i=1}^{23} \alpha_i \, \text{Industry}_{ij} + \sum_{i=24}^{42} \beta_i \, \text{WC}_{ij} + \sum_{i=43}^{45} \pi_i \, \text{IC}_{ij} + \sum_{i=46}^{50} \delta_i \, \text{UNION}_{ij} + \varepsilon_j$$

where

$\log(\text{earnings})_j$ = log of yearly earnings for the March data and log of weekly earnings for the May data for the j^{th} individual.

Industry_{ij} = Dummy variables for regulated industries (rail, bus, taxi, trucking, warehousing, water transportation, air, pipelines, radio and television, phone, telegraph, electricity, gas, electricity and gas combinations, sanitary) and non-manufacturing industries (mining, construction, trade, finance, repair, home services and other). The excluded category was manufacturing. The non-manufacturing dummies were not included in the regressions that included concentration ratio.

WCij = A series of worker characteristics variables including potential experience (measured by age and age^2), education (years completed), marital status (dummy), veteran status (dummy), gender, race (dummy variable for caucasian race), occupation (9 1-digit census occupation dummy variables) and location (dummy variable for residence in the South). In addition regressions using the March data included controls for weeks worked last year and hours worked last year. The regressions using the May data included a control for usual hours worked per week.

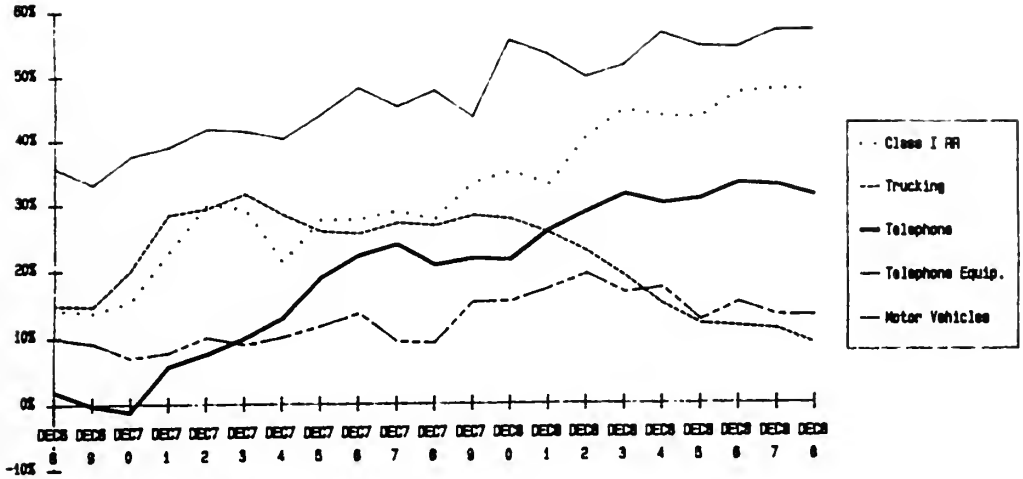
IC_{ij} = Industry characteristics of the industry for the j^{th} individual. These characteristics were union density, concentration ratio measured as the (corrected) 4-digit concentration, and an interaction term between density and concentration.

UNIONij = A dummy variable for union status and interactions between this dummy and the dummy variables for railroad industry, airline industry, telephone industry and trucking industry. These dummies were only included in the regressions that estimate union-nonunion differentials from the May data.

e_{ij} = individual error term

Figure 1a

Raw Differential (NLR Hourly Earnings)



Percentage Differential with Manufacturing for Production Workers

Figure 1b

Raw Differential (March Yearly Earnings)

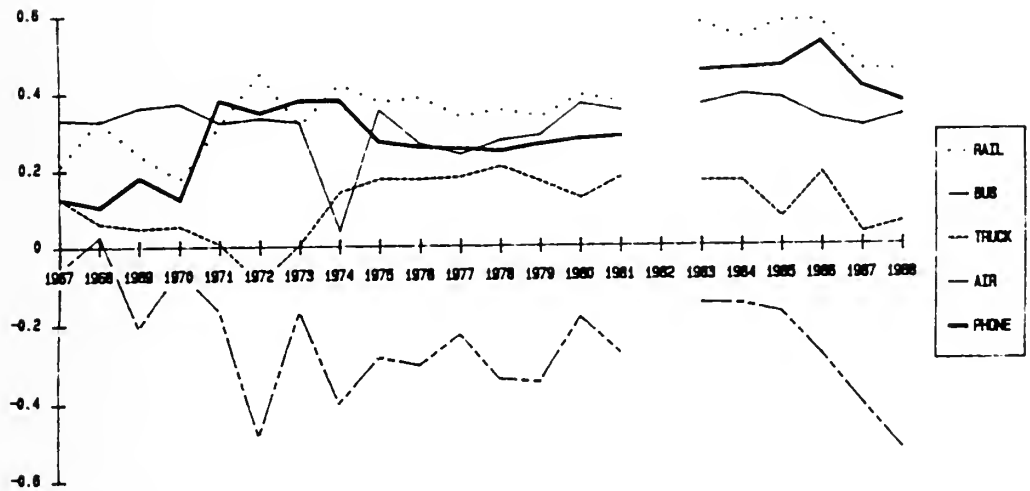
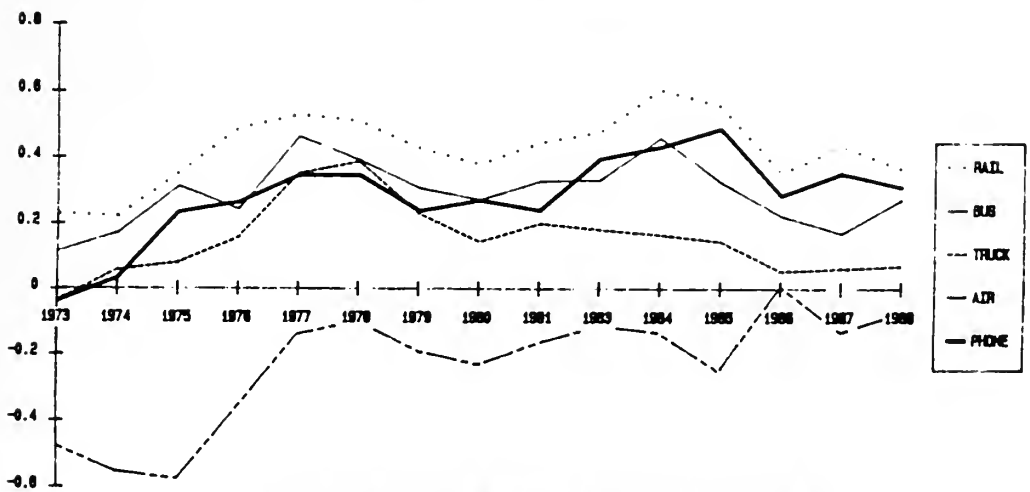


Figure 1c

Raw Differential (May Weekly Earnings)



Coefficients from log earnings equations with manufacturing reference group

Figure 2a

Differential Controling for Worker Characteristics (March)

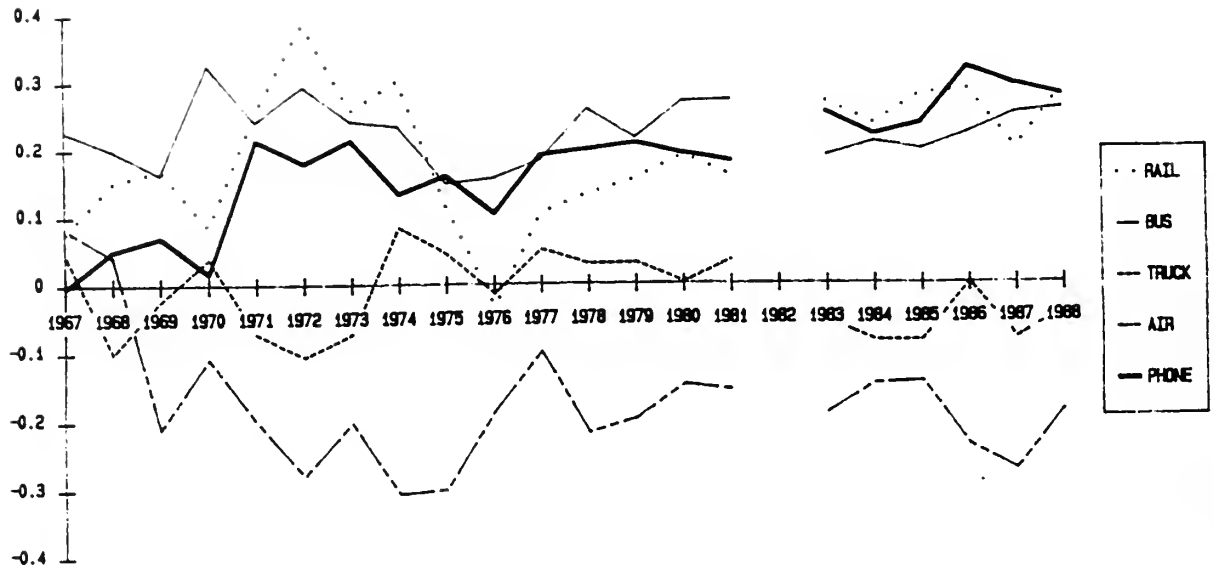
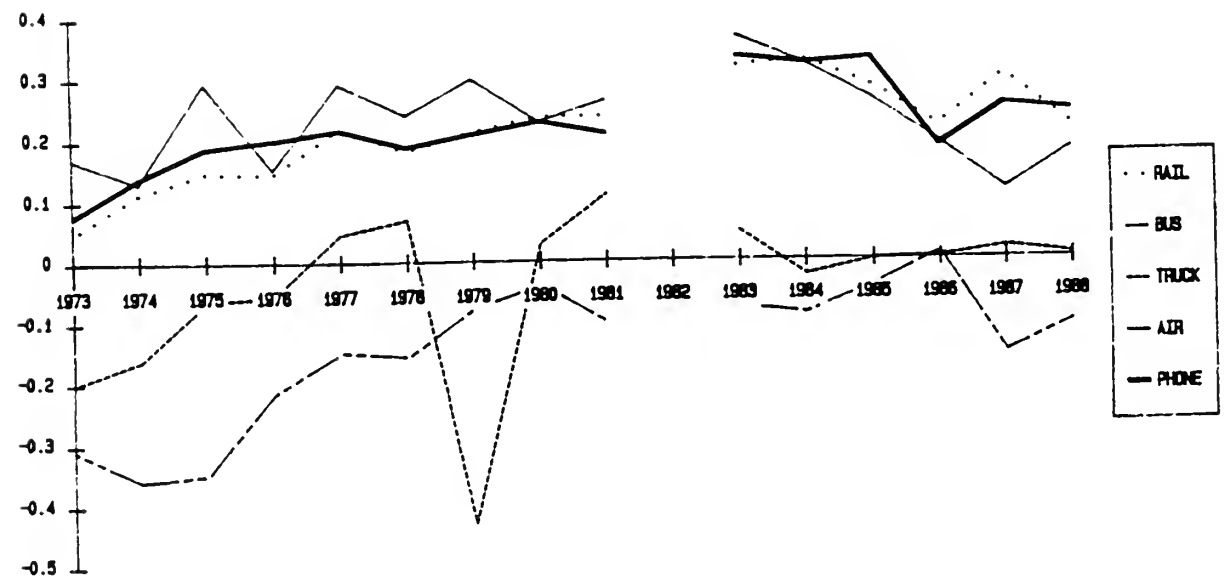


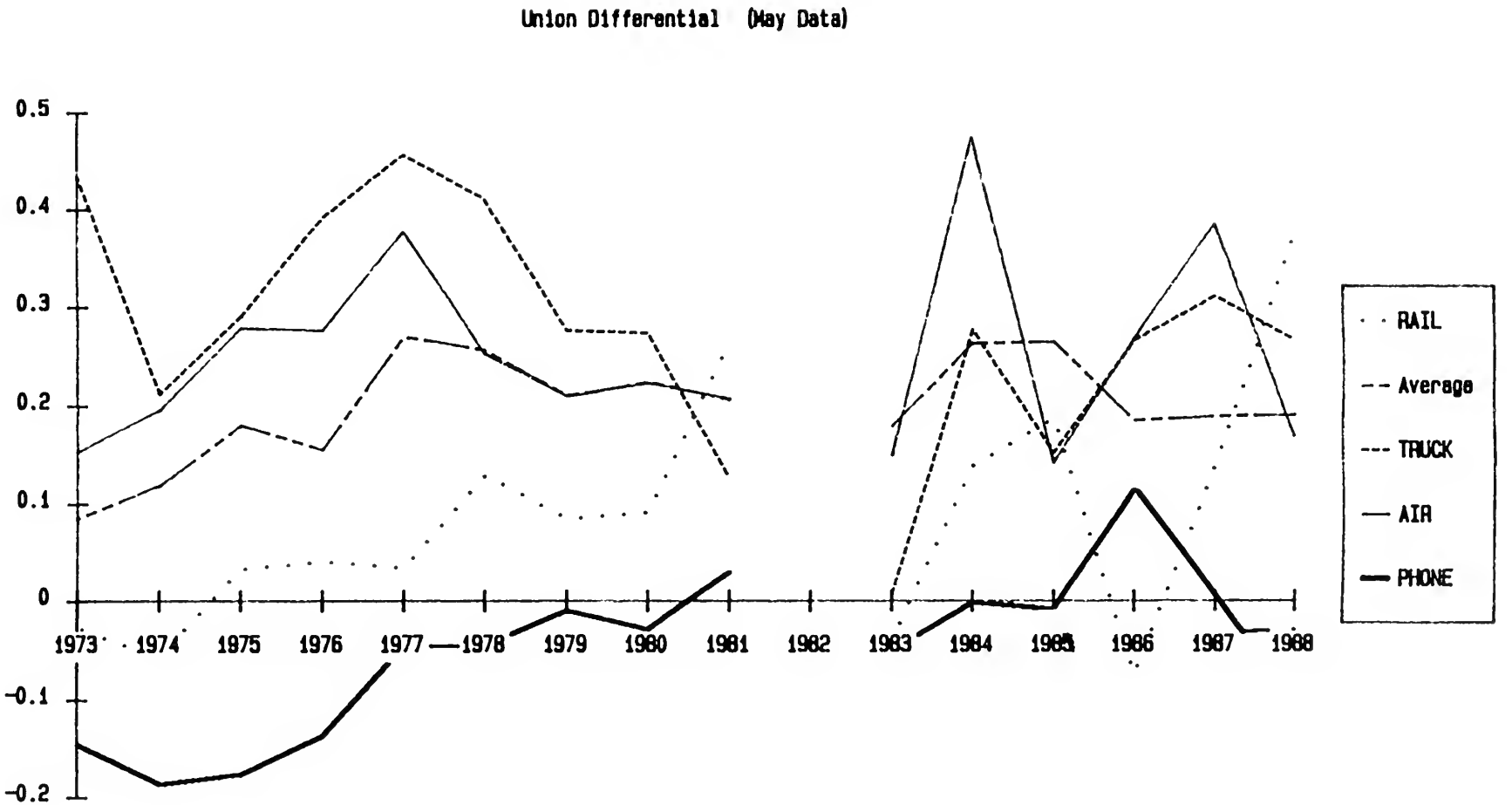
Figure 2b

Differential Controling for Worker Characteristics (May)



Coefficients from log earnings regressions using manufacturing as the reference group

Figure 3



Coefficients from log earnings regressions with interaction terms of union status and industry

Differential Controling for Density (March Data)

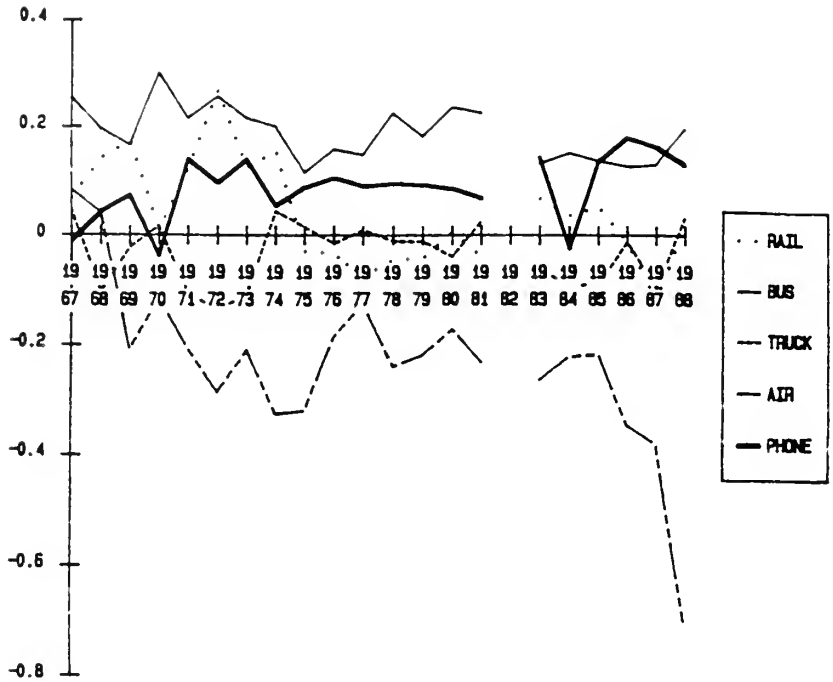


Figure 4b

Differential Controling for Density (May)

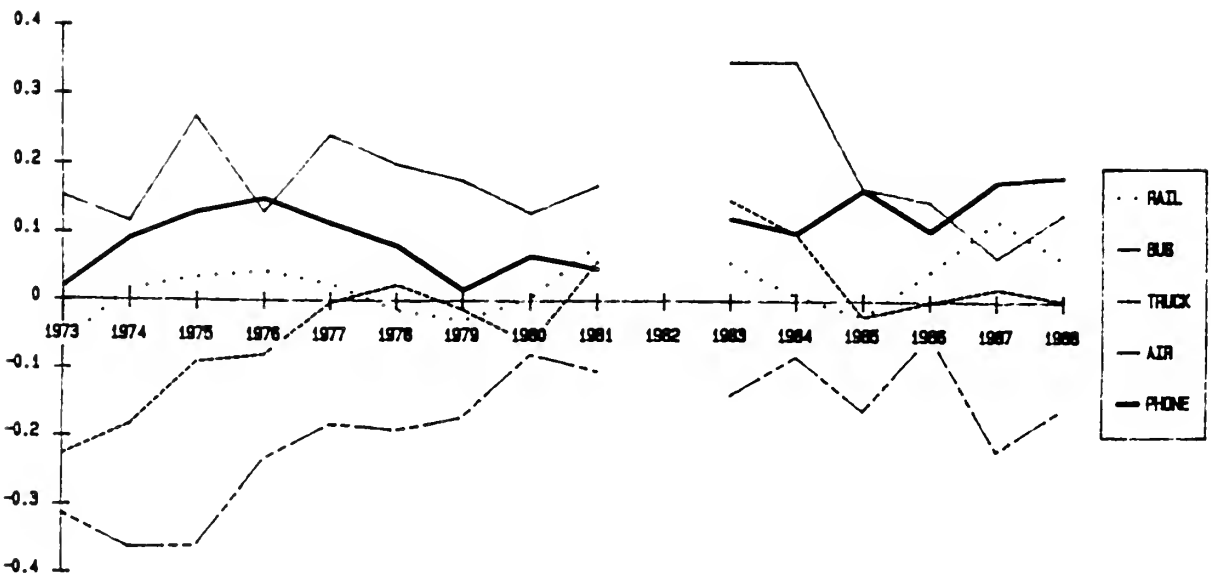


Figure 5a

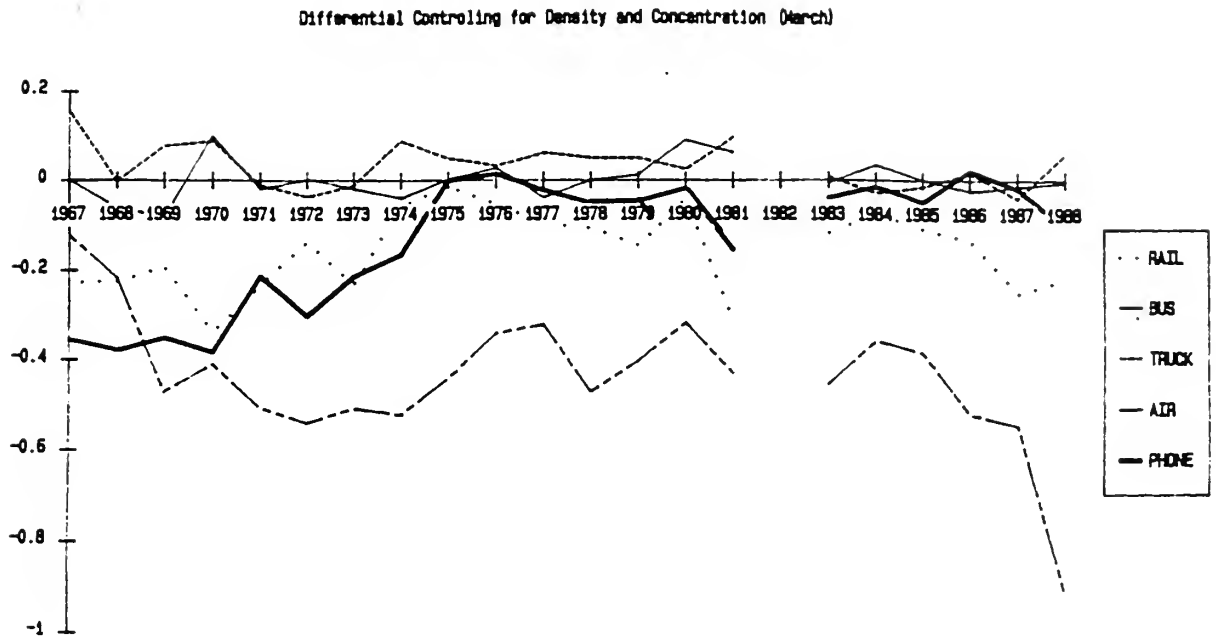


Figure 5b

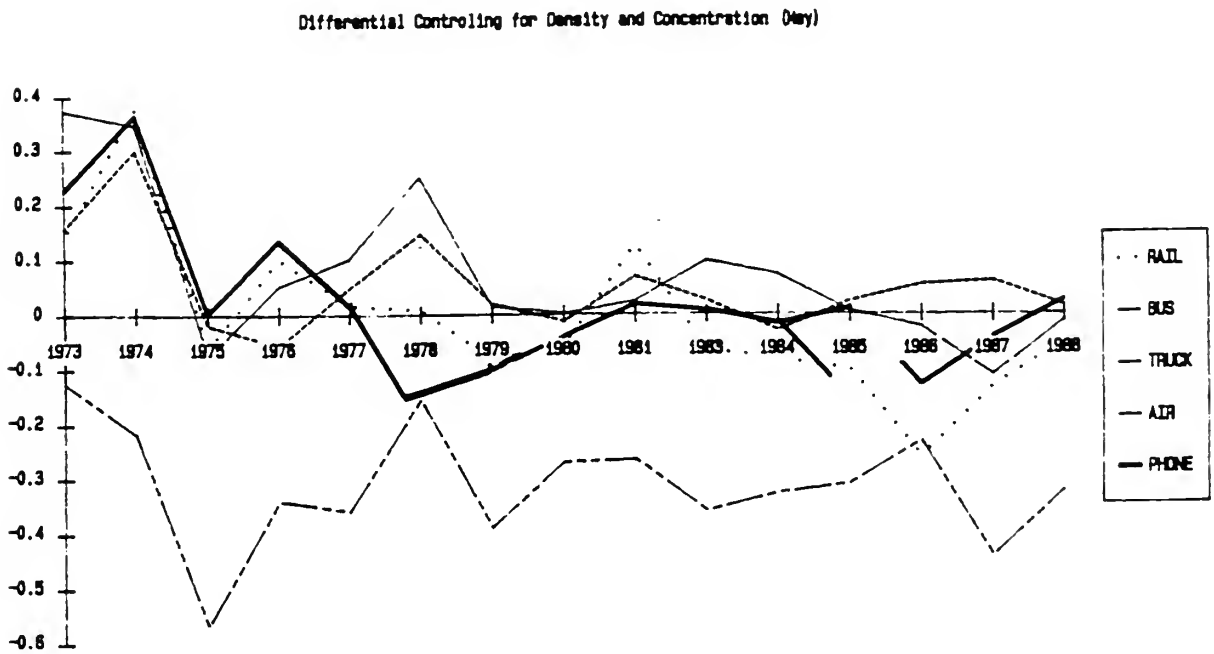
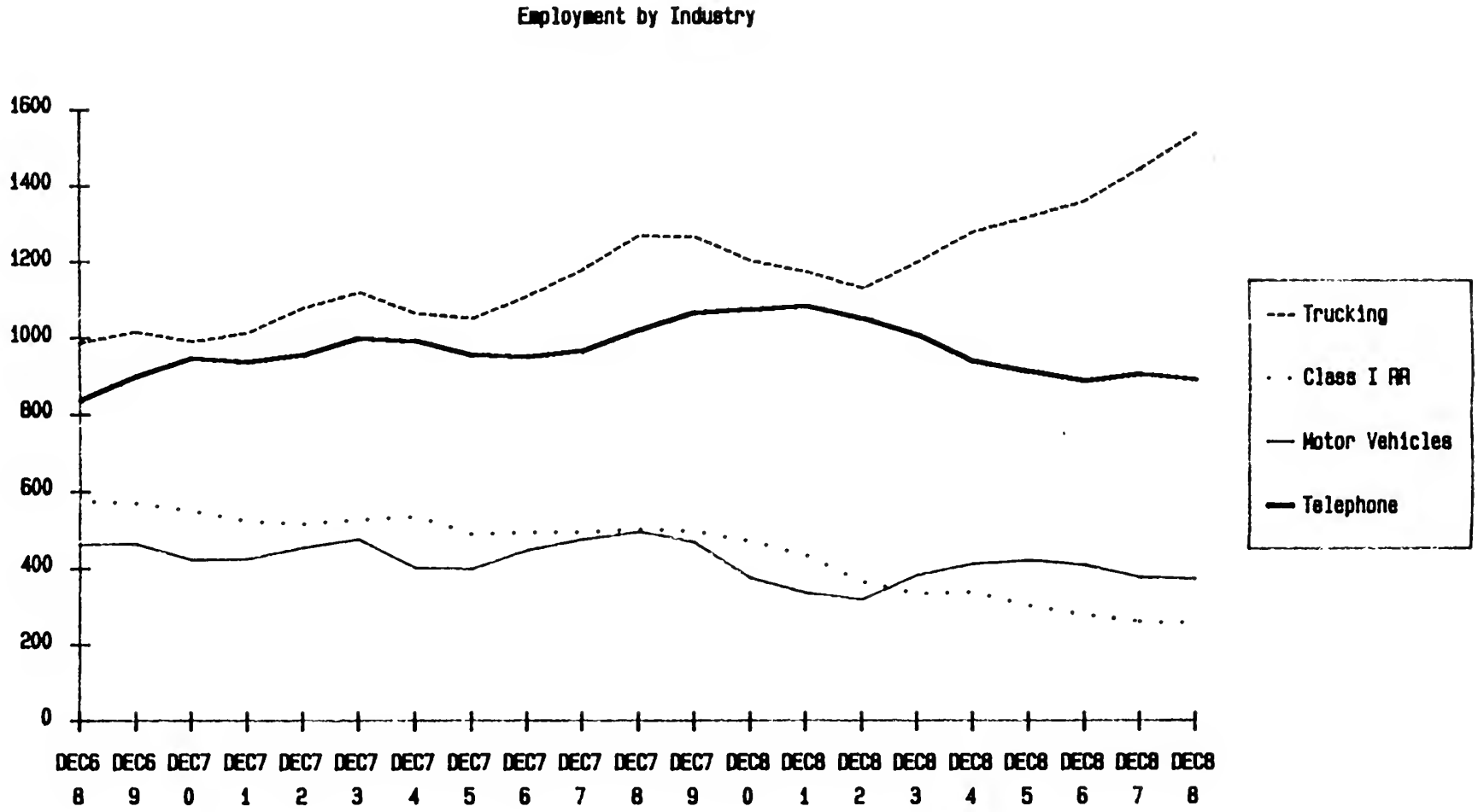


Figure 6



Source: USBLS, Monthly Labor Review, Employment of Production Workers, various issues

Table 1: Selected Regression Results

	MLR 1968-1988	March 1967-1988	May 1973-1988	MLR Before	March Before	May Before	MLR After	March After	May After	MLR Change	March Change	May Change
Raw Differential												
Rail	0.32	0.40	0.43	0.26	0.35	0.42	0.42	0.50	0.45	0.16	0.15	0.02
	0.10	0.01	0.02	0.07	0.01	0.02	0.05	0.02	0.03	0.03	0.02	0.03
Bus		-0.26	-0.18		-0.26	-0.25		-0.27	-0.10		-0.01	0.15
		0.02	0.02		0.02	0.03		0.03	0.03		0.03	0.04
Truck	0.22	0.13	0.19	0.25	0.14	0.24	0.19	0.13	0.14	-0.07	-0.01	-0.10
	0.07	0.01	0.01	0.06	0.01	0.02	0.07	0.01	0.01	0.04	0.02	0.02
Air		0.33	0.30		0.30	0.31		0.34	0.30		0.04	-0.01
		0.01	0.02		0.02	0.03		0.01	0.02		0.02	0.04
Phone	0.18	0.31	0.29	0.14	0.27	0.26	0.31	0.45	0.35	0.17	0.18	0.09
	0.12	0.01	0.01	0.10	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.02
Controling for Demographics												
Rail		0.17	0.21		0.13	0.19		0.24	0.27		0.11	0.08
		0.01	0.01		0.01	0.01		0.01	0.02		0.01	0.02
Bus		-0.19	-0.13		-0.19	-0.17		-0.19	-0.08		-0.01	0.08
		0.01	0.02		0.01	0.02		0.02	0.02		0.02	0.03
Truck		-0.01	-0.03		0.01	0.01		-0.03	0.00		-0.04	-0.01
		0.01	0.01		0.01	0.01		0.01	0.00		0.01	0.01
Air		0.22	0.25		0.19	0.24		0.24	0.25		0.05	0.01
		0.01	0.01		0.01	0.02		0.01	0.01		0.02	0.03
Phone		0.19	0.23		0.16	0.21		0.27	0.26		0.10	0.04
		0.00	0.01		0.01	0.01		0.01	0.02		0.01	0.02
Union Differential												
Rail			0.08			0.05			0.17			0.12
			0.03			0.03			0.05			0.06
Average			0.22									
			0.00									
Truck			0.34			0.40			0.28			-0.12
			0.02			0.02			0.02			0.03
Air			0.26			0.30			0.24			-0.06
			0.02			0.04			0.03			0.05
Phone			-0.05			-0.06			-0.01			0.05
			0.01			0.02			0.03			0.03

Entries are variance weighted coefficients from yearly regressions (standard errors below each coefficient)

Table 1: Selected Regression Results

Differential	MLR Hrly Wages	March 1967-1988	May 1973-1988	MLR Before	March Before	May Before	MLR After	March After	May After	MLR Change	March Change	May Change
Controling for Demographics Density & CCR												
Rail		-0.12	-0.02		-0.10	0.01		-0.17	-0.10		-0.07	-0.10
		0.01	0.02		0.01	0.02		0.02	0.03		0.02	0.03
Bus		-0.42	-0.31		-0.39	-0.30		-0.49	-0.33		-0.10	-0.03
		0.01	0.02		0.01	0.02		0.02	0.03		0.02	0.03
Truck		0.03	0.04		0.05	0.07		0.01	0.02		-0.04	-0.05
		0.01	0.01		0.01	0.01		0.00	0.01		0.01	0.01
Air		0.01	0.07		-0.01	0.09		0.02	0.06		0.03	-0.03
		0.01	0.01		0.01	0.02		0.01	0.01		0.01	0.02
Phone		-0.06	0.02		-0.08	0.05		-0.03	-0.04		0.05	-0.09
		0.01	0.01		0.01	0.01		0.02	0.02		0.01	0.02
Controling for Demographics and Density												
Rail		-0.01	0.02		-0.01	0.00		0.00	0.05		0.01	0.05
		0.01	0.01		0.01	0.01		0.01	0.02		0.01	0.02
Bus		-0.25	-0.17		-0.21	-0.20		-0.32	-0.14		-0.10	0.06
		0.01	0.02		0.01	0.02		0.02	0.02		0.02	0.03
Truck		-0.03	0.00		-0.01	-0.03		-0.04	0.03		-0.03	0.06
		0.01	0.01		0.01	0.01		0.01	0.01		0.01	0.02
Air		0.17	0.19		0.17	0.21		0.17	0.19		0.00	-0.02
		0.01	0.01		0.01	0.02		0.01	0.01		0.01	0.02
Phone		0.09	0.10		0.08	0.09		0.14	0.15		0.06	0.06
		0.01	0.01		0.01	0.01		0.01	0.02		0.01	0.02

Entries are variance weighted coefficients from yearly regressions (standard errors below each coefficient)